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1.1 PROJECT BACKGROUND

The United States Army Corps of Engineers (USACE), in partnership with the White River State Park and the City of Indianapolis (City), is in the final phase of completing the White River Urban Reach (White River State Park) of the 1994 Central Indianapolis Waterfront Concept Master Plan. The City manages the wastewater collection system serving most of Marion County. Much of the older portions of the City, especially Center Township, are served by combined sewers that carry both storm water runoff and sewage. During rain events, combined sewers fill to their capacity and discharge a mixture of storm water runoff and sewage directly into waterways which adversely affects their water quality. The waterways include Fall Creek, White River, Pogues Run, Pleasant Run, Eagle Creek, and Bean Creek. In addition, fluctuating water levels and low dissolved oxygen (DO) in the waterways are challenges to achieving the benefits envisioned by the Central Indianapolis Waterfront Concept Master Plan. Subsequently, the City of Indianapolis and a team of consultants prepared a draft Long Term Control Plan (LTCP) in April 2001 to address the problems created by combined sewer overflows (CSOs), and to meet state and federal regulations pertaining to CSOs. The overall goal of the LTCP was to identify alternatives to enhance water quality and to achieve compatibility with the Central Indianapolis Waterfront Concept Master Plan. Presently, the City is negotiating with regulatory agencies on the final LTCP.

One of the remedial measures to address this issue is to build consolidation sewers and convey the CSOs to a storage and conveyance tunnel. This would provide storage for CSO volumes during and after rainfall events. The draft LTCP included plans for two separate tunnels: the Fall Creek Deep Tunnel that would collect the CSOs along Fall Creek, and the White River Central Tunnel that would collect the CSOs along White River near and directly downstream of the Fall Creek confluence. However, revisions to the draft LTCP and negotiations between the City and regulatory agencies have resulted in combining the two separate tunnels into one tunnel. Therefore, a total of 43 CSO outfalls (27 along Fall Creek and 16 along White River), as shown in Figure 1.1, will be consolidated and conveyed into the proposed Fall Creek/White River Tunnel. A Flow Augmentation System to provide additional

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INSERT FIGURE 1.1

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flow in Fall Creek, Pogues Run and Pleasant Run during dry-weather periods also was proposed in the LTCP.

1.2 PROJECT SCOPE AND OBJECTIVES

The USACE has retained G.E.C., Inc. (GEC) and the Black & Veatch Corporation (B&V) under Contract Number DACW27-03-D-005 to complete an evaluation study and preliminary design of CSO abatement facilities to supplement the City of Indianapolis' LTCP. This report presents information on the Fall Creek/White River Tunnel System, and the Flow Augmentation System alternatives for inclusion in the City's CSO LTCP. Construction and project considerations, risk management strategies, and the decision screening methodology used to evaluate the alternatives are included. The preliminary opinion of probable costs and project schedule are also provided. Many available documents and other sources of information were reviewed as part of the project. A detailed listing of the documents reviewed for this project is provided in Appendix A – Documents Reviewed.

The principal elements of this study include:

- Evaluate available regional geology and hydrogeology of the tunnel alignment corridor
- Conduct a Phase I Environmental Site Assessment
- Identify construction considerations
- Identify project considerations
- Identify alternatives for augmenting flow in Fall Creek, Pogues Run, and Pleasant Run
- Prepare a preliminary opinion of probable costs
- Develop a preliminary project schedule
- Identify and evaluate modifications to be included in the City's CSO LTCP
- Develop a geotechnical exploration program
- Identify risk management strategies
- Utilize decision screening to assist in the recommendation of alternatives

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1.3 REPORT ORGANIZATION

The report has been organized in a methodical manner based on consideration of critical elements of the project. Following the introduction, the geology and hydrogeology is discussed, as the subsurface information is a key element in a tunnel project. Next, information on the Fall Creek/White River Tunnel is presented, as it represents the primary goal of the overall project to provide storage of CSOs. The Deep Tunnel Pump Station is then covered, as its function is to dewater the tunnel and convey the flow to the Interplant Connection Structure. Next, the consolidation sewers, drop shafts and connection tunnels are discussed, as they convey the CSO from the outfall to the tunnel for storage in that order. Construction and project considerations are then addressed focusing on items related to the overall tunnel project. Risk management is discussed to address its importance following the tunnel project component sections and considerations. Then, the geotechnical exploration program is presented, based on its importance to the overall program.

The next several sections of the report present information on the Flow Augmentation System and discuss water reuse goals. Material is presented on the Belmont AWT Effluent Pump Station, force main alternatives, and outfall structure locations and alternatives for discharge of the treated effluent along Fall Creek, Pogues Run, and Pleasant Run. The next several sections of the report present information pertaining to all aspects of the project including the preliminary opinion of probable costs, decision screening, preliminary project schedule, and the conclusions and recommendations. The last section provides a list of references that are noted throughout the report.

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1.4 ABBREVIATIONS

Abbreviations used in this report are as follows:

ARV	Air Release Valve
ASCE	American Society of Civil Engineers
AST	Above Ground Storage Tank
ASTM	American Society of Testing and Materials
AUA	American Underground Construction Association
AWT	Advanced Wastewater Treatment
AWWA	American Water Works Association
B&V	Black and Veatch Corporation
bgs	Below Ground Surface
BOD	Biochemical Oxygen Demand
CDP	*Criterium Decision Plus*
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
cfm	Cubic Feet per Minute
CFR	Code of Federal Regulations
CSO	Combined Sewer Overflow
CST	Indianapolis Clean Stream Team
DIP	Ductile Iron Pipe
DO	Dissolved Oxygen
DPR	City of Indianapolis Department of Parks and Recreation
DPW	City of Indianapolis Department of Public Works
DS	Drop Shaft
e.g.	For Example
ENR-CCI	Engineering News Record - Construction Cost Index
EPA	United States Environmental Protection Agency
EPBM	Earth Pressure Balanced Machine
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
et al	And Others

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°F	Degrees Fahrenheit
ft	Feet, Foot
fps	Feet per Second
FRP	Fiberglass Reinforced Plastic
GEC	G.E.C., Inc.
GBR	Geotechnical Baseline Report
GDR	Geotechnical Data Report
gpm	Gallons per Minute
H_2S	Hydrogen sulfide
HDPE	High Density Polyethylene
HI	Hydraulic Institute
hp	Horsepower
HTRW	Hazardous, Toxic, Radioactive Waste
HVAC	Heating, Ventilation, Air Conditioning
I&C	Instrumentation and Control
IAC	Indiana Administrative Code
IC	Indiana Code
IDEM	Indiana Department of Environmental Management
i.e.	That Is
IGS	Indiana Geological Survey
in	Inch, Inches
Inc	Incorporated
INDOT	Indiana Department of Transportation
IUPUI	Indiana University – Purdue University Indianapolis
LF	Linear Feet or Foot
LLC	Limited Liability Corporation
LTCP	Long Term Control Plan
LUST	Leaking Underground Storage Tank
msl	Mean Sea Level
m/s	Meters per Second
MG	Million Gallons
mgd	Million Gallons per Day
mg/L	Milligrams per Liter

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NFRAP	No Further Remedial Action Planned
NPL	National Priority List
NPSHA	Net Positive Suction Head Available
NPSHR	Net Positive Suction Head Required
O&M	Operation and Maintenance
OER	Office of Environmental Response
OES	Office of Environmental Services
OSHA	Occupational Safety and Health Administration
P&ID	Process and Instrumentation Diagram
PCCP	Prestressed Concrete Cylinder Pipe
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Conditions
RUST	Registered Underground Storage Tank
SAP	Sampling and Analysis Plan
SCADA	Supervisory Control and Data Acquisition
SWL	Solid Waste Landfill
TARP	Tunnel and Reservoir Project
TBM	Tunnel Boring Machine
TDS	Total Dissolved Solids
TSD	Treatment, Storage and Disposal
U-U	Unconsolidated-Undrained
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VFD	Variable Frequency Drive

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1.5 COMMON TUNNEL SYSTEM TERMINOLOGY

Common tunnel system terminology used throughout the report is defined below:

Adit – Tunnel segment connecting the drop shaft flows to the deep tunnel.

Connection Tunnel – Tunnel in bedrock or overburden that conveys flows from multiple drop shafts to the main tunnel constructed in bedrock.

Drop Shaft – Vertical shaft constructed to convey combined sewer flows into the tunnel from the outfall locations and consolidation sewers.

Intermediate Working Shaft – Vertical shaft constructed along the tunnel alignment at one or more points to aid in construction of the main tunnel.

Main Tunnel – Horizontal tunnel constructed in bedrock for the storage of combined sewer flows.

Retrieval Shaft – Vertical shaft located at the main tunnel completion point for retrieval of the tunnel boring machine.

Tunnel Boring Machine – Machine used specifically for the purpose of excavating rock and soils used to construct and form the shape of the tunnel.

Working Shaft – Vertical shaft located at the tunnel starting point for insertion of the tunnel boring machine and primary removal of excavated spoils.